

IN THE CLAIMS:

1 1. (Currently Amended) A system for indexing and manipulating a set of backup data
2 stored on a destination system interconnected with a source file system having source
3 data from which the backup data is transmitted to the destination system comprising:
4 a management application executed by a computer, where the management appli-
5 cation (a) communicates with the destination system and that accesses data identifiers
6 that identify the data as directories, files, or qtrees related to the backup data organized in
7 a tree structure and representing a plurality of persistent consistency point images
8 (PCPIs) of the data, each with associated information related to creation time, ~~and~~ (b)
9 scans the plurality of PCPIs stored on the destination system to generate an index of di-
10 rectories, files, or qtree, where each directory, file, or qtree has one or more versions cre-
11 ated at one or more different points in time, and (c) organizes the data identifiers into a
12 structure that enables the data to be displayed in a plurality of organizational formats ac-
13 cording to directory, file or qtree; and
14 a user interface ~~that allows selective display of the data identifiers so that the~~
15 ~~backup data can be accessed and manipulated by a user in a desired organizational format~~
16 to select a directory, file, or qtree to view, where the management application returns a
17 list of only the selected directory, file, or qtree and the one or more versions of the se-
18 lected directory, file, or qtree.

1 2. (Original) The system as set forth in claim 1 further comprising a database that stores
2 the data identifiers and rules for handling the data identifiers for retrieval by the user in-
3 terface and the management application.

1 3. (Previously Presented) The system as set forth in claim 2 further comprising, in the
2 destination system, a network data management protocol (NDMP) extension, communi-
3 cating with a storage operating system of the destination system and providing NDMP-

4 based communication between the management application and the storage operating
5 system.

1 4. (Original) The system as set forth in claim 3 further comprising a job framework that
2 organizes a plurality of backup operations and restore operations by the management ap-
3 plication and that communicates with the user interface so as to enable a user to access
4 information with respect to status of the backup operations and restore operations organ-
5 ized by the job framework.

1 5. (Original) The system as set forth in claim 4 further comprising a scheduler that inter-
2 faces with the source system and that performs the backup operations, transmitting the
3 backup data from the source system to the destination system at a predetermined time in-
4 terval.

1 6. (Original) The system as set forth in claim 5 wherein the user interface includes a
2 screen that enables a user to set a desired lag time after which failure to complete a
3 scheduled backup operation caused an event to occur.

1 7. (Currently Amended) The system as set forth in claim 1 ~~wherein further comprising~~
2 ~~the desired organizational format~~ user can select ~~includes at least each of~~ (a) a listing of
3 source data entries indexed by names of the source system and (b) ~~a listing of source data~~
4 ~~entries indexed by names of directories of the source system, and (c) a listing of source~~
5 data entries indexed by names of volumes of the destination system in which the backup
6 data from the source data resides.

1 8. (Original) The system as set forth in claim 7 wherein each of the entries of each listing
2 includes a browse backups button that enables a user to view backup data stored on the
3 destination system that is associated respectively with each of the entries.

1 9. – 11. (Cancelled)

1 12. (Currently Amended) The system as set forth in claim ~~11~~8 wherein each of the en-
2 tries of each listing includes a restore button that enables a user to view restorable backup
3 data structures with respect to each of the entries and to restore the backup data structures
4 to the source data.

1 13. (Cancelled)

1 14. (Currently Amended) The system as set forth in claim 12 wherein ~~the data structure~~
2 ~~each qtree includes~~ include qtree relationships with respect to other qtrees within the
3 source system.

1 15. (Original) The system as set forth in claim 14 wherein the user interface includes a
2 command for destroying a qtree relationship between the source data and a selected vol-
3 ume of the backup data in the destination system.

1 16. (Original) The system as set forth in claim 15 wherein the management application is
2 adapted to delete a respective qtree associated with the qtree relationship on the destina-
3 tion system in response to activation of the command for destroying.

1 17. (Original) The system as set forth in claim 1 further comprising, in the user interface,
2 a screen that enables selected of the source data to be listed as entries and to be transmit-
3 ted as backup data to the destination system at a time separate from a scheduled backup
4 time.

1 18. (Currently Amended) A method for indexing and manipulating a set of backup data
2 stored on a destination system interconnected with a source file system having source
3 data from which the backup data is transmitted to the destination system comprising:

communicating, by a management client, with the destination system and accessing data identifiers that identify the data as directories, files, or qtrees related to the backup data organized in a tree structure and representing a plurality of persistent consistency point images (PCPIs) of the data, each with associated information related to creation time;

_____ scanning the plurality of PCPIs stored on the destination system to generate an index of directories, files, or qtrees, where each directory, file, or qtree has one or more versions created at one or more different points in time; and

_____ organizing the data identifiers into a structure that enables the data to be displayed in a plurality of organizational formats according to directory, file, or directory;
and

selectively selecting displaying, on a user interface, the data identifiers so that the backup data can be accessed and manipulated by a user in a desired organizational format a directory, file, or qtree to view, where the management application returns a list of only the selected directory, file, or qtree and the one or more versions of the selected directory, file, or qtree.

19. (Original) The method as set forth in claim 18 further comprising storing, in a database, the data identifiers and rules for handling the data identifiers for retrieval by the user interface and the management application.

20. (Previously Presented) The method as set forth in claim 19 further comprising providing, in the destination system, a network data management protocol (NDMP) extension, communicating with a storage operating system of the destination system and providing NDMP-based communication between the management application and the storage operating system.

21. (Original) The method as set forth in claim 20 further comprising organizing, in a job framework, a plurality of backup operations and restore operations by the management

3 application and that communicates with the user interface so as to enable a user to access
4 information with respect to status of the backup operations and restore operations organ-
5 ized by the job framework.

1 22. (Original) The method as set forth in claim 21 further comprising interfacing a sched-
2 uler with the source system and performing, at scheduled times, backup operations that
3 transmit the backup data from the source system to the destination system at a predeter-
4 mined time interval.

1 23. (Original) The method as set forth in claim 22 wherein the user interface includes a
2 screen that enables a user to set a desired lag time after which failure to complete a
3 scheduled backup operation caused an event to occur.

1 24. (Currently Amended) The method as set forth in claim 18 ~~wherein further comprising~~
2 ~~the desired organizational format includes at least each of selecting~~ (a) a listing of source
3 data entries indexed by names of the source system and (b) ~~a listing of source data entries~~
4 ~~indexed by names of directories of the source system, and (c) a listing of source data en-~~
5 tries indexed by names of volumes of the destination system in which the backup data
6 from the source data resides.

1 25. (Original) The method as set forth in claim 24 wherein each of the entries of each list-
2 ing includes a browse backups button that enables a user to view backup data stored on
3 the destination system that is associated respectively with each of the entries.

1 26. – 28. (Cancelled)

1 29. (Currently Amended) The method as set forth in claim ~~28-24~~ wherein each of the en-
2 tries of each listing includes a restore button that enables a user to view restorable backup

3 data structures with respect to each of the entries and to restore the backup data structures
4 to the source data.

1 30. (Cancelled)

1 31. (Currently Amended) The method as set forth in claim ~~30-29~~ wherein ~~the data struc-~~
2 ~~tures include~~each qtree includes qtree relationships with respect to other qtrees within the
3 source system.

1 32. (Original) The method as set forth in claim 31 wherein further comprising providing,
2 in the user interface, a command for destroying a qtree relationship between the source
3 data and a selected volume of the backup data in the destination system.

1 33. (Previously Presented) The method as set forth in claim 32 further comprising, in re-
2 sponse to activation of the command for destroying, deleting a respective qtree associated
3 with the qtree relationship on the destination system in response to activation of the
4 command for destroying.

1 34. (Original) The method as set forth in claim 18 further comprising providing, in the
2 user interface, a screen that enables selected of the source data to be listed as entries and
3 to be transmitted as backup data to the destination system at a time separate from a
4 scheduled backup time.

1 35. (Currently Amended) A method for managing backup of data from a source system to
2 a destination system and restore of backup data, relative to source data, from the source
3 system to the destination system comprising:
4 communicating, by a management application, with each of the source system and
5 the destination system and transmitting requests to read a data organization residing on
6 each of the source system and the destination system to derive ~~a structure~~ an index of data

~~identifiers~~directories, files, or qtrees for the data organization each of the source system
and the destination system; and
scanning a plurality of persistent consistency point images (PCPIs) stored on the
destination system to generate the index of directories, files, or qtree, where each direc-
tory, file, or qtree has one or more versions created at one or more different points in
time;
selecting a directory, file, or qtree to view; and
displaying, with a user interface communicating with the management applica-
tion, only the selected directory, file, or qtree information related to active data on the
source system derived from source system ~~data organization identifiers~~index related to
active data and the selected information directory, file, or qtree related to backup data on
the destination system derived from destination system ~~data identifiers~~index related to
~~persistent consistency point images (PCPIs)~~ transmitted from the source data during
backup operations.

36. (Cancelled)

37. (Currently Amended) The method as set forth in claim ~~36~~35 wherein the steps of
communicating and transmitting include formatting information into a network data man-
agement protocol (NDMP).

38. (Currently Amended) The method as set forth in claim ~~36~~35 further comprising acti-
vating user interface buttons associated with entries of the displayed selected information
to conduct either of a backup operation and a restore operation with respect to the entries.

39. (Currently Amended) A computer-readable medium, comprising:
a processor;
said computer-readable medium including program instructions executed on the
processor to manage ~~for managing~~ backup of data from a source system to a destination

5 system and restore of backup data, relative to source data, from the source system to the
6 destination system, the program instructions performing the steps of:

7 communicating, by a management application, with each of the source system and
8 the destination system and transmitting requests to read a data organization residing on
9 each of the source system and the destination system to derive ~~a structure~~ an index of di-
10 rectories, files, or qtrees ~~data identifiers for the data organization~~ each of the source sys-
11 tem and the destination system;

12 scanning a plurality of persistent consistency point images (PCPIs) stored on the
13 destination system to generate the index of directories, files, or qtrees, where each direc-
14 tory, file, or qtree has one or more versions created at one or more different points in
15 time;

16 selecting a directory, file, or qtree to view; and

17 displaying, with a user interface communicating with the management applica-
18 tion, only the selected directory, file, or qtree ~~information~~ related to active data on the
19 source system derived from source system ~~data organization identifiers~~ index related to
20 active data and the selected directory, file, or qtree ~~information~~ related to backup data on
21 the destination system derived from destination system ~~data identifiers~~ index related to
22 ~~persistent consistency point images (PCPIs)~~ transmitted from the source data during
23 backup operations.

1 40. (Cancelled)

1 41. (Original) The computer-readable medium as set forth in claim 39 wherein the steps
2 of communicating and transmitting include formatting information into a network data
3 management protocol (NDMP).

1 42. (Currently Amended) A system, comprising:

2 a source storage system that generates a plurality of persistent consistency point
3 images (PCPIs), and transfers the plurality of PCPIs and data to a destination storage sys-
4 tem;

5 the destination storage system executes a management client, where the manage-
6 ment client organizes the plurality of PCPIs and the data into an index using a database to
7 allow the plurality of PCPIs and the data to be displayed in ~~a plurality of organizational~~
8 formats a listing of source data entries indexed by names of directories, file or qtrees of
9 the source storage system, where each directory, file, or qtree has one or more versions
10 created at one or more different points in time; and

11 an interface to select a data entry for a directory, file, or qtree, and the manage-
12 ment client returns a list of only the selected directory, file, or qtree and the one or more
13 versions of the selected directory, file, or qtree.

1 43. (Currently Amended) The system of claim 42, wherein the organizational format in-
2 cludes at least each of (a) a listing of source data entries indexed by names of the source
3 storage system and (b) ~~a listing of source data entries indexed by names of directories of~~
4 ~~the source storage system, and (c) a listing of source data entries indexed by names of~~
5 volumes of the destination storage system in which the backup data from the source data
6 resides.

1 44. – 45. (Cancelled)

1 46. (Previously Presented) The system of claim 42, wherein the database stores the plu-
2 rality of PCPIs and rules for handling the plurality of PCPIs for retrieval by the interface
3 and the management client.

1 47. (Previously Presented) The system of claim 42, wherein the source storage system
2 upon initialization sends a base PCPI and data to the destination storage system.

1 48. (Previously Presented) The system of claim 42, further comprising a scheduler that
2 interfaces with the source storage system and performs backup operations of transmitting
3 backup data including one or more PCPIs and change data from the source storage sys-
4 tem to the destination storage system at a predetermined time interval.

1 49. (New) A method, comprising:
2 transferring a plurality of persistent consistency point images (PCPIs) from a
3 source storage system to a destination storage system;
4 scanning the plurality of PCPIs to create an index of data structures in a database
5 on the destination system, wherein each data structure is a file, directory, or qtree and
6 each data structure has one or more versions created at one or more different points in
7 time;
8 selecting a data structure to view;
9 returning an entry for the selected data structure and entries for the one or more
10 versions of the selected data structure to allow a user to select a particular entry to re-
11 store.